# Virginia
# State Water Resources Plan
# and
# Water Supply Planning
# in the
# Roanoke River Basin

December 18, 2014

# Presentation Road Map

Local/Regional Water Supply Plans

State Water Resources Plan

Cumulative Impact Analysis

Roanoke River Basin

Summary

# Water Supply Planning in VA

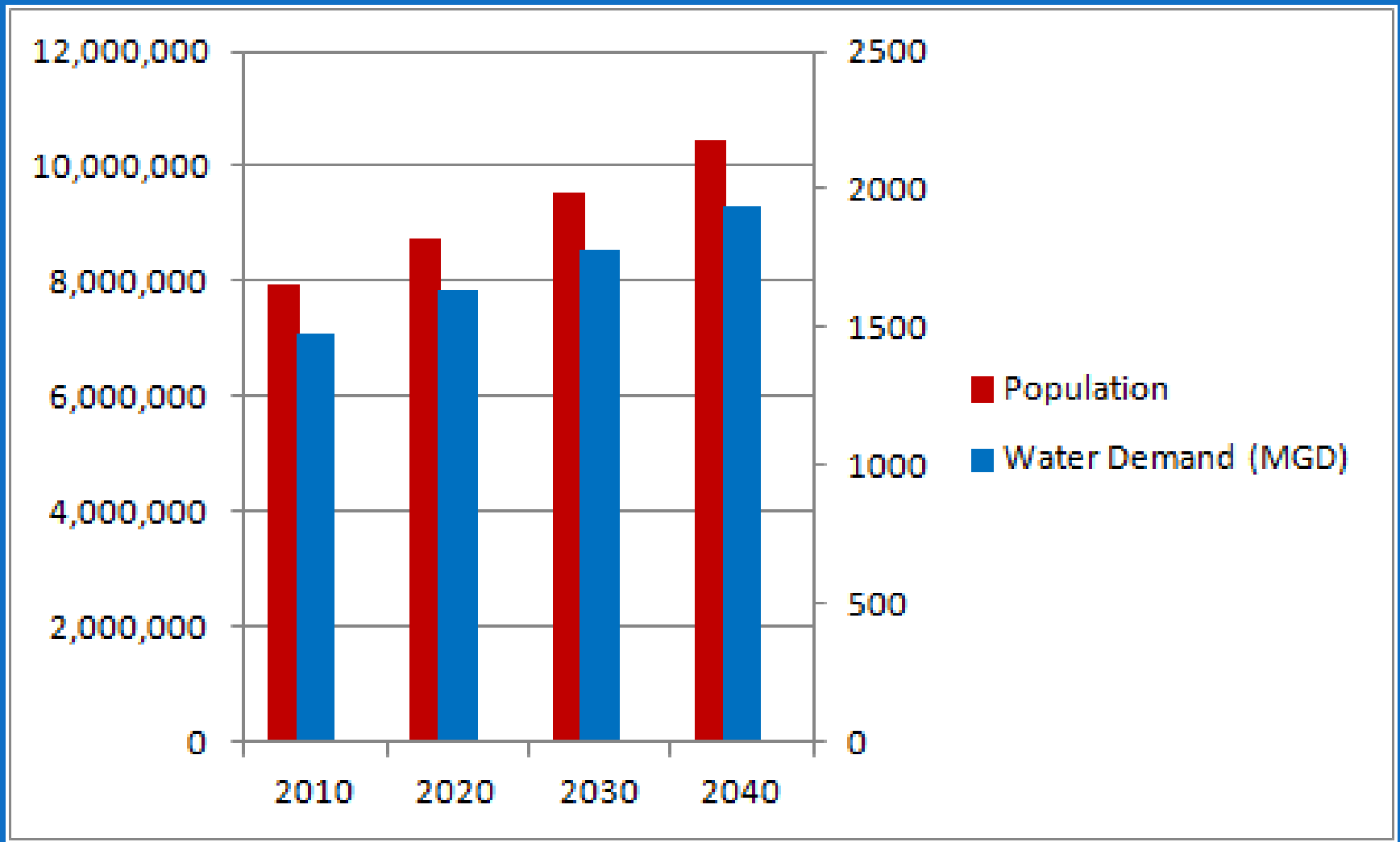
- Forty-eight water supply plans submitted 38 regional; 10 local
- All water supply plans found compliant, with conditions
- All plans will be updated by 2018 and will address conditions detailed in compliance review

# State Water Resources Plan

- First document of its kind in Virginia
- SWRP includes information from all water supply plans, as well as information from other sources
- 250,000 records entered in content management system for modeling

- For the first time, cumulative impacts of future water demands on water resources can be analyzed
- Outreach efforts will begin in areas where meeting future demand is likely to result in impacts to beneficial uses
- DEQ will provide feedback on SWRP findings to regions and localities

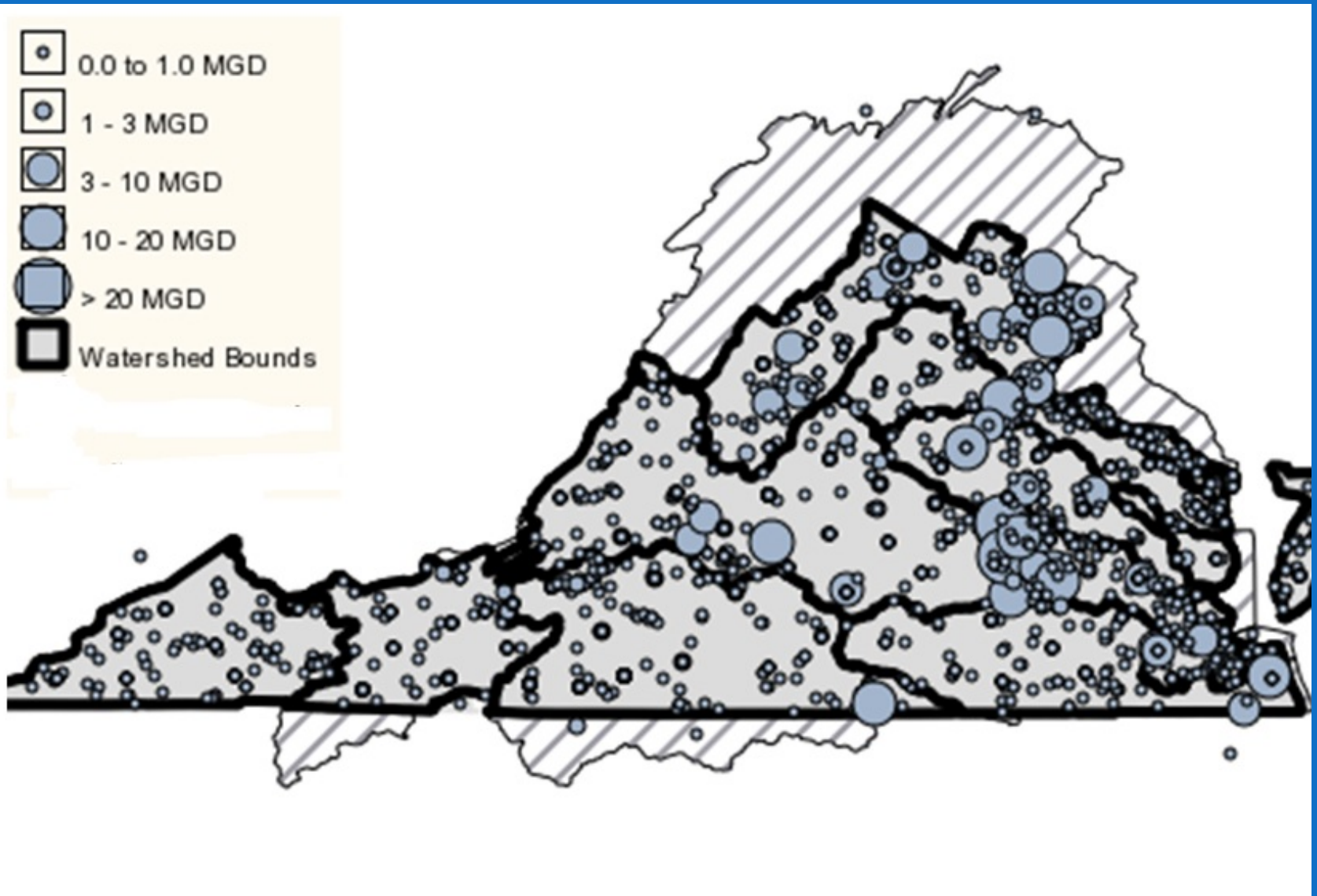
# Virginia Population and Water Demand Trends



# What the SWRP Tells Us

- Approximately 450 MGD needed by 2040
- 32% increase in water demand consistent with anticipated increase in population
- Plans predict that approximately 77% of total water demand will be from surface water
- Concentration of Demands: 97% of surface water withdrawals are predicted to occur in 25% of stream reaches

# VA Spatial Trends in 2040 Demand



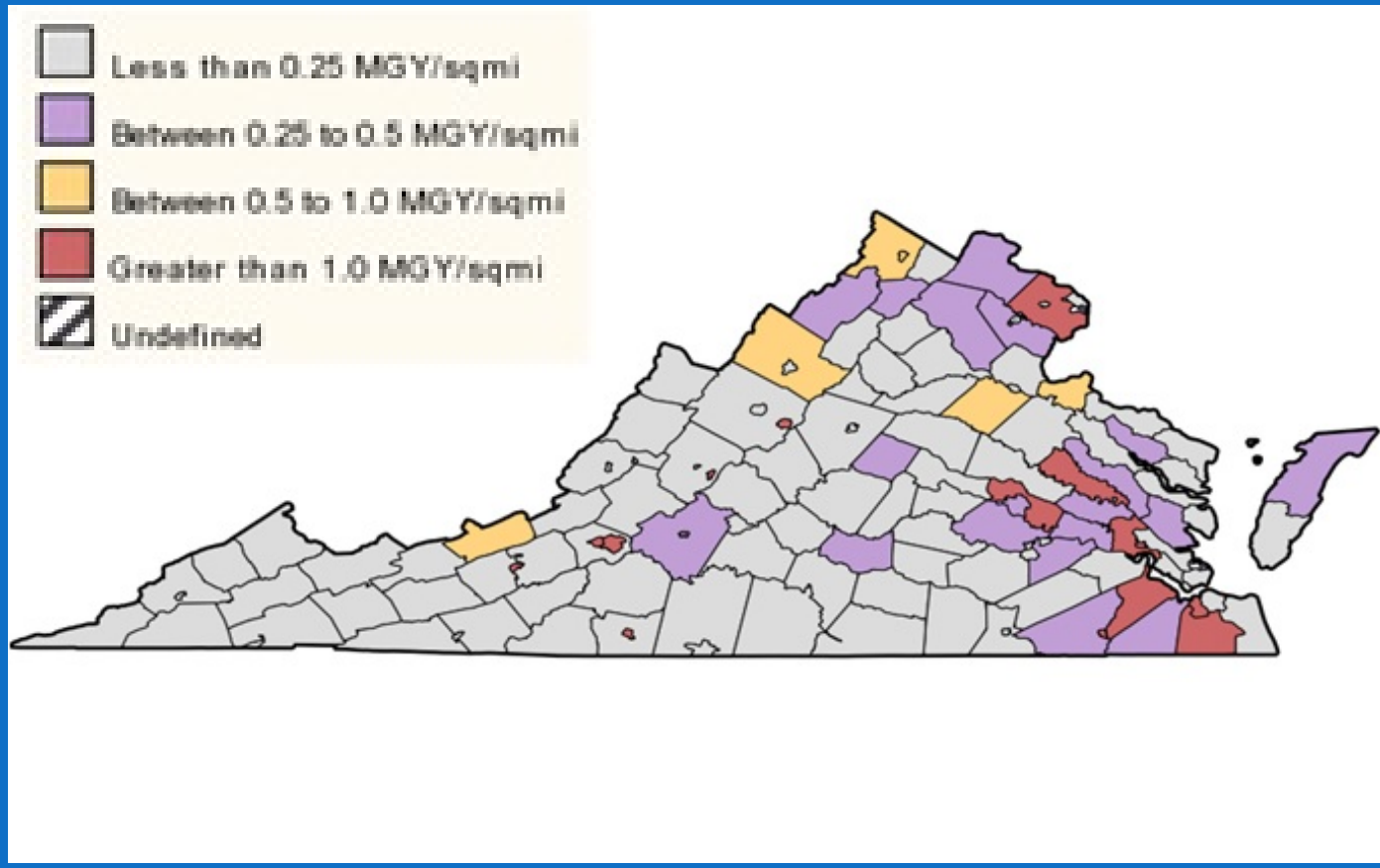
# Surface Water Withdrawals

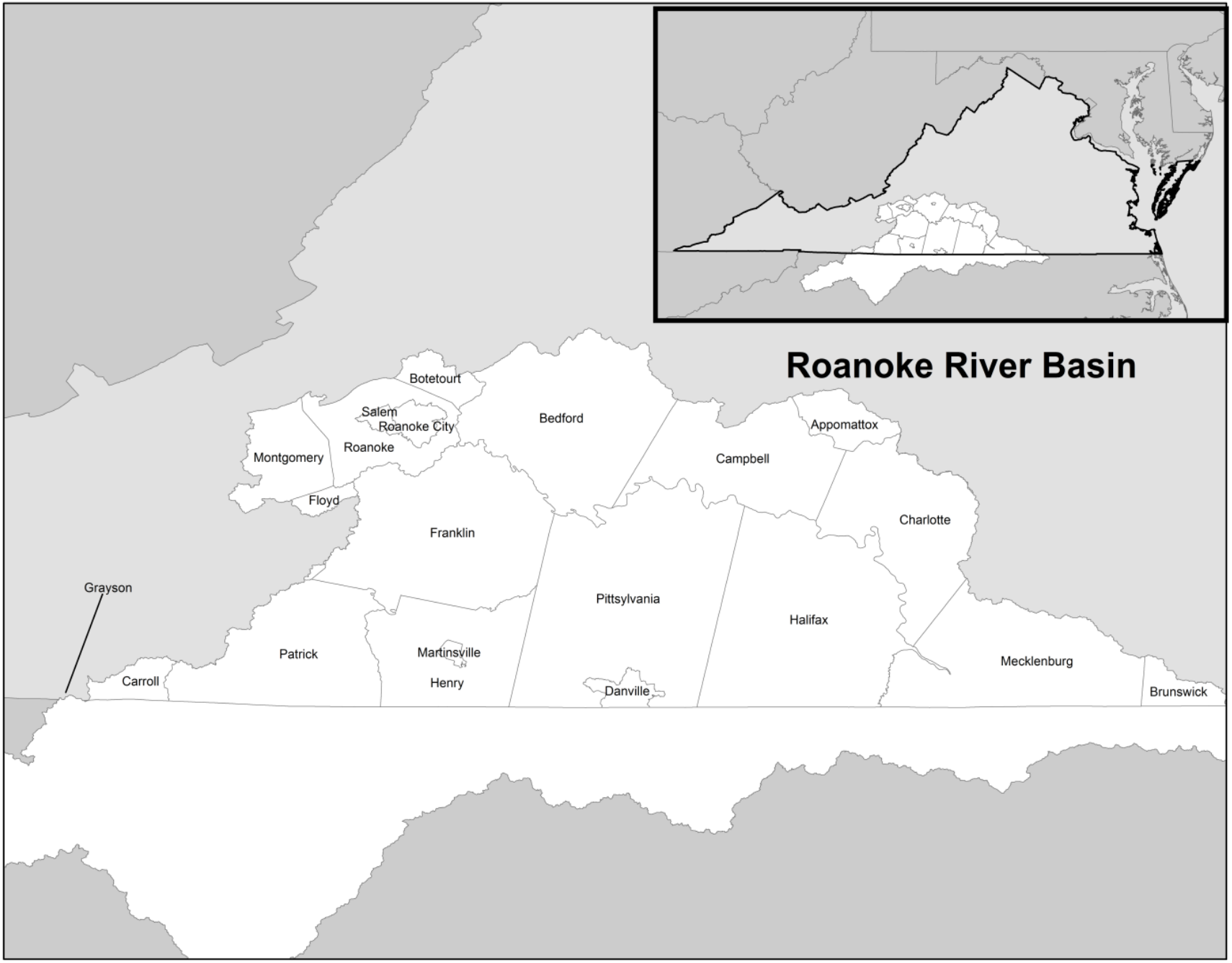
# Impacts of Projected Demands

- Higher demands = lower drought flows
  - Demands are concentrated
  - Negative impacts on in-stream beneficial uses, particularly during low flows
- Unregulated withdrawals have potential impacts
    - 82% of surface water withdrawn unregulated
- Water is available, but not without accepting risks

# Groundwater Withdrawals

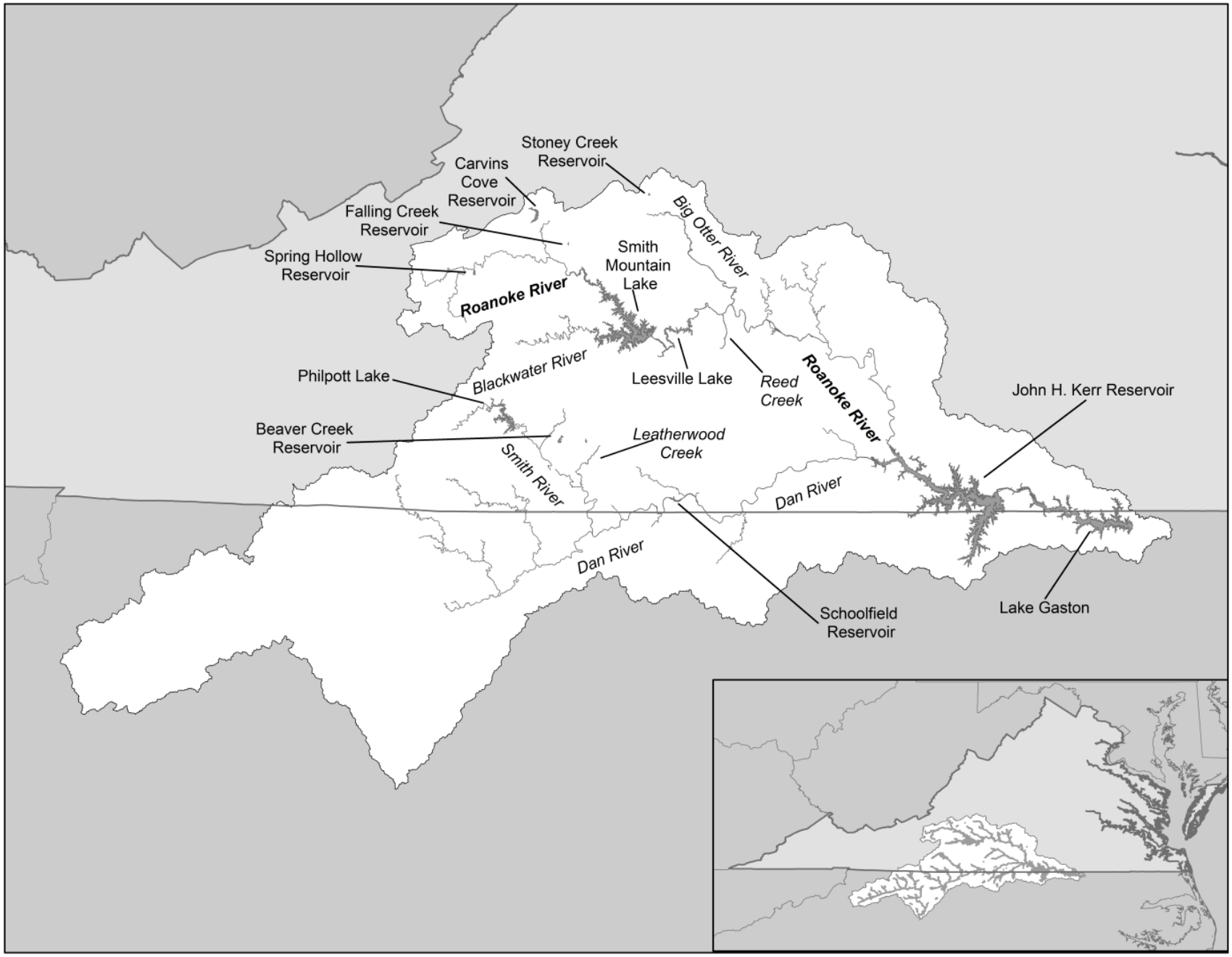
- 23% of total water demand is expected to come from GW
- 75% of GW demand outside established GWMA




Roanoke River Basin
Botetourt
Salem
Roanoke City
Roanoke
Montgomery
Floyd
Bedford
Appomattox
Campbell
Charlotte
Franklin
Grayson
Pittsylvania
Halifax
Patrick
Martinsville
Henry
Carroll
Danville
Mecklenburg
Brunswick

# Roanoke River Basin

- Covers approximately 15% of Virginia's total area
- Existing surface water sources – large reservoirs
  - Kerr Reservoir (Buggs Island Lake)
  - Lake Gaston
  - Leesville Lake
  - Smith Mountain Lake


Stoney Creek Reservoir
Carvins Cove Reservoir
Falling Creek Reservoir
Spring Hollow Reservoir
Big Otter River
Smith Mountain Lake
Roanoke River
Blackwater River
Philpott Lake
Leesville Lake
Reed Creek
Roanoke River
John H. Kerr Reservoir
Beaver Creek Reservoir
Leatherwood Creek
Smith River
Dan River
Dan River
Schoolfield Reservoir
Lake Gaston

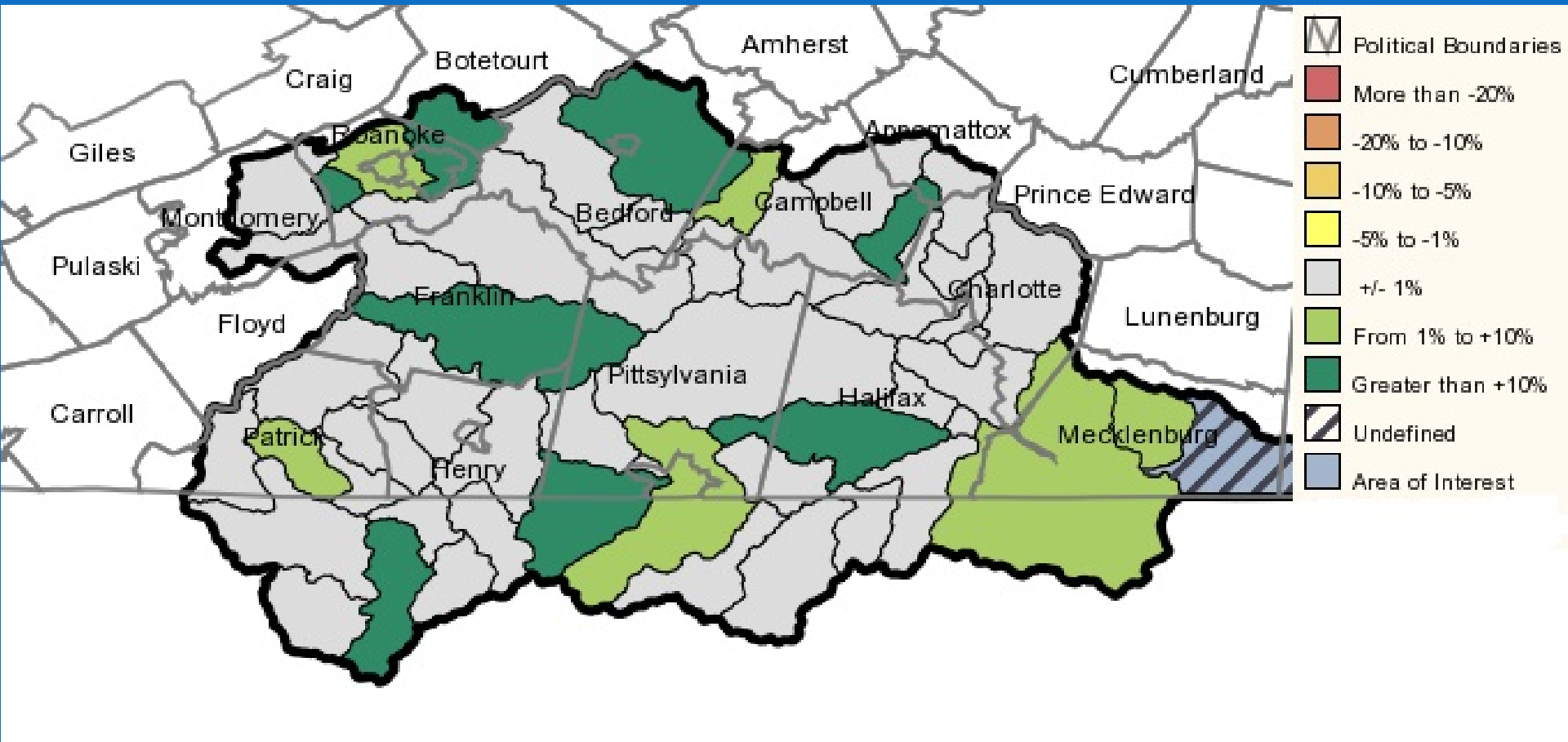
# Roanoke River Basin

- Most community water systems in the basin rely on groundwater as their source
- Approximately 39% of people in the basin use private groundwater wells for residential water supply

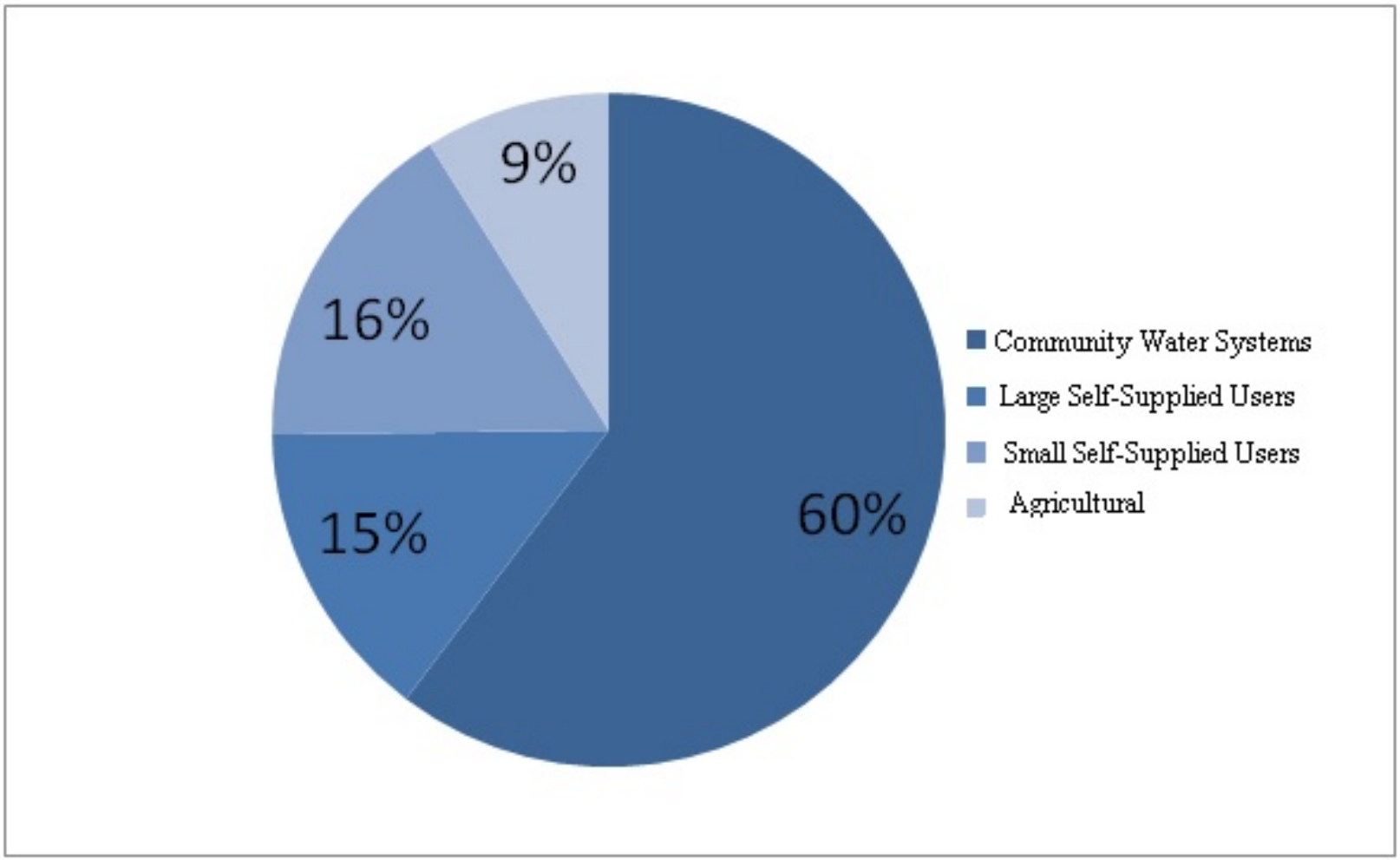
# Projected Demand in the Virginia Portion of the Roanoke River Basin 2010 to 2040

- Population = 14% increase
- Projected water demand = 24% increase
- Groundwater use = 33% increase
- Surface water use = 11% increase

# Changes in Local Withdrawal 2010 to 2040

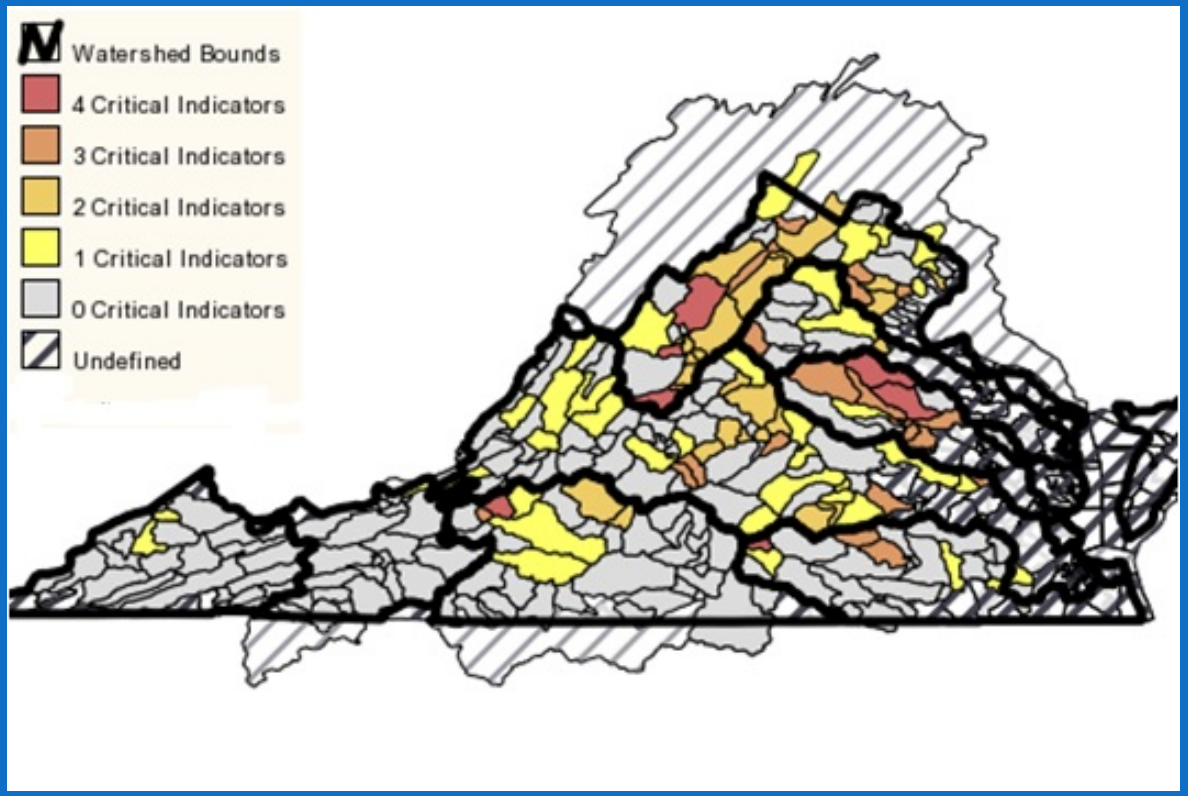


# Roanoke River Basin: 2040 Projected Demand by User Type



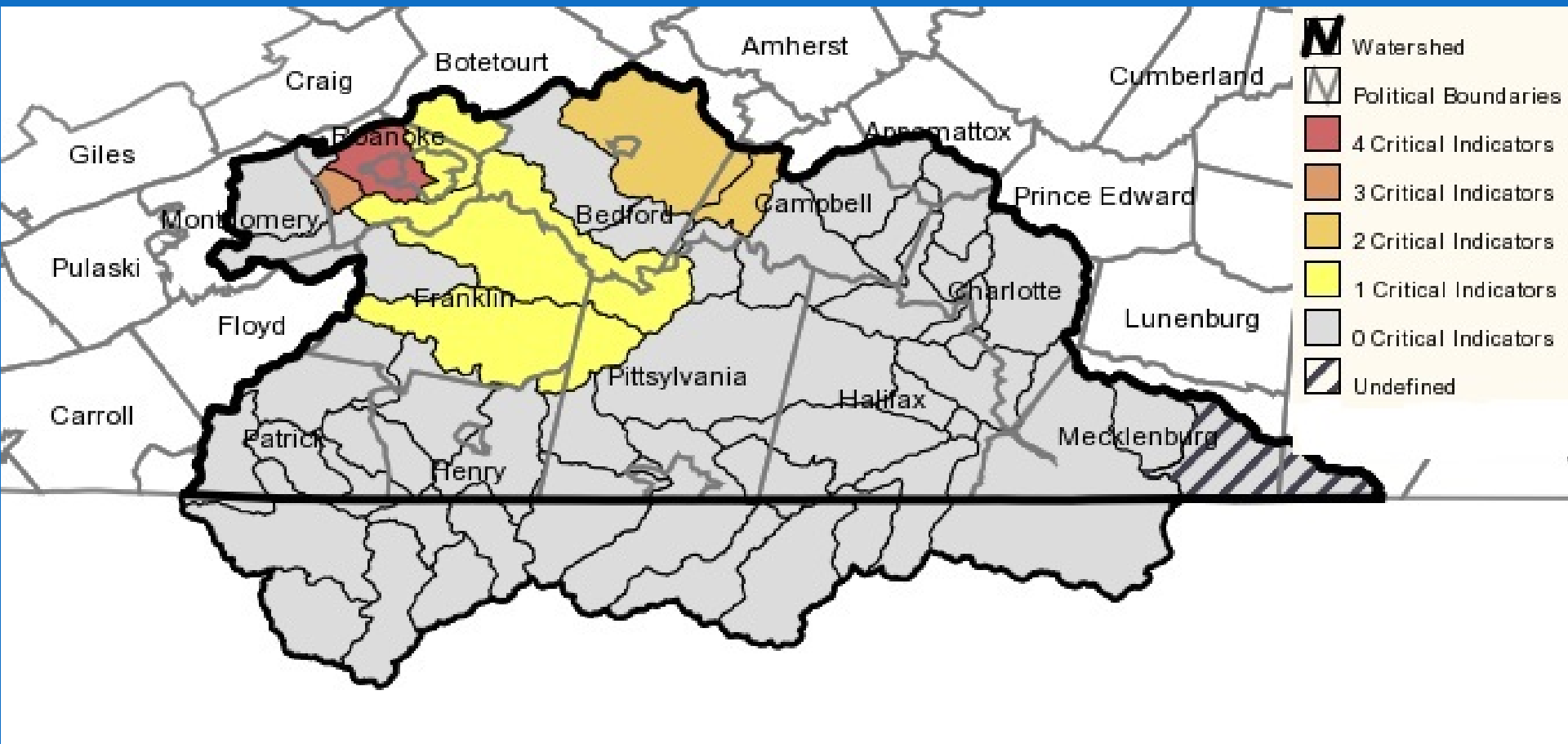
# Cumulative Impact Analysis

- Four Metrics:
  - August Low Flow
  - 7Q10
  - Change in Drought of Record Flow
  - Withdrawal as Percentage of September Drought Warning – Overall System Stress




Stream reach considered at risk based on exceedance of screening thresholds

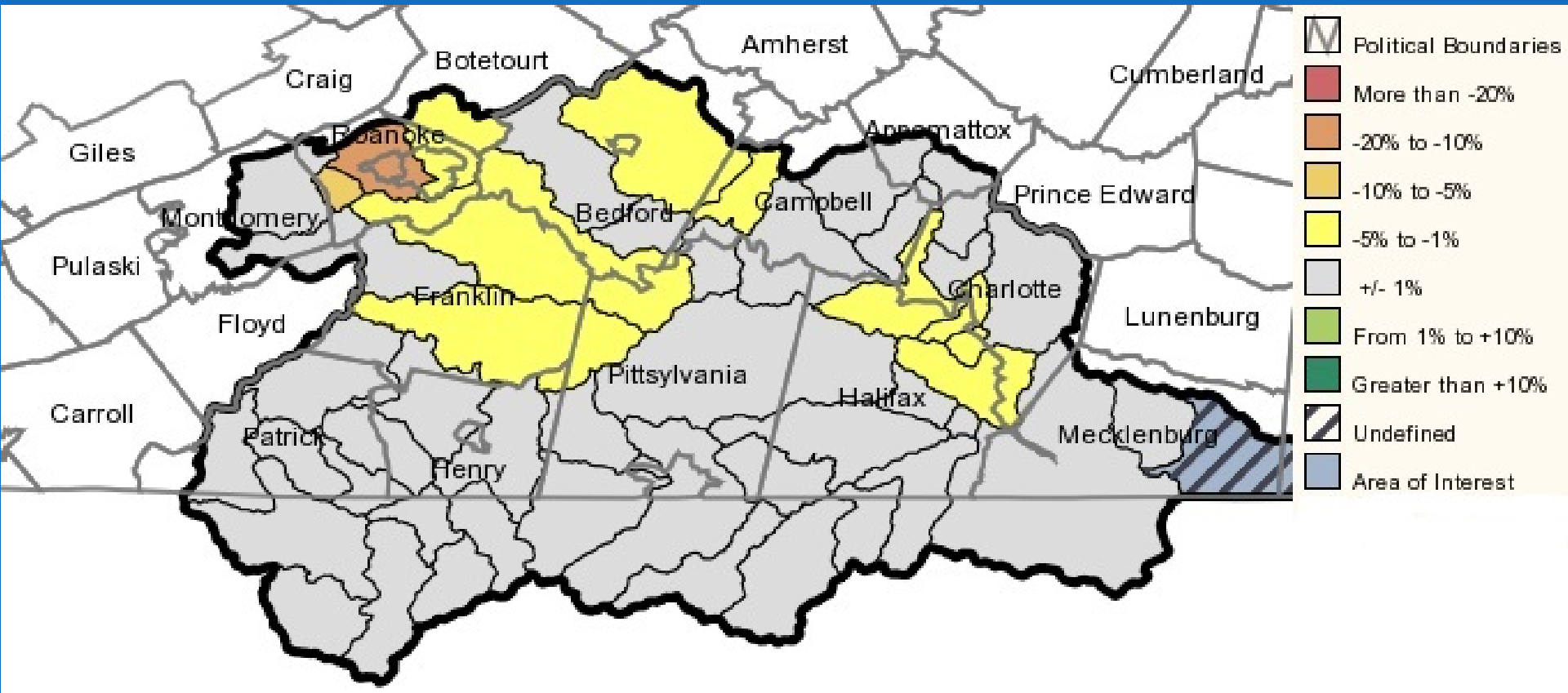
# Roanoke River Basin Cumulative Impact Analysis



# August Low Flow

- Decreasing flows may result in negative impacts to aquatic life
- Greater than 10% reduction considered to be high risk

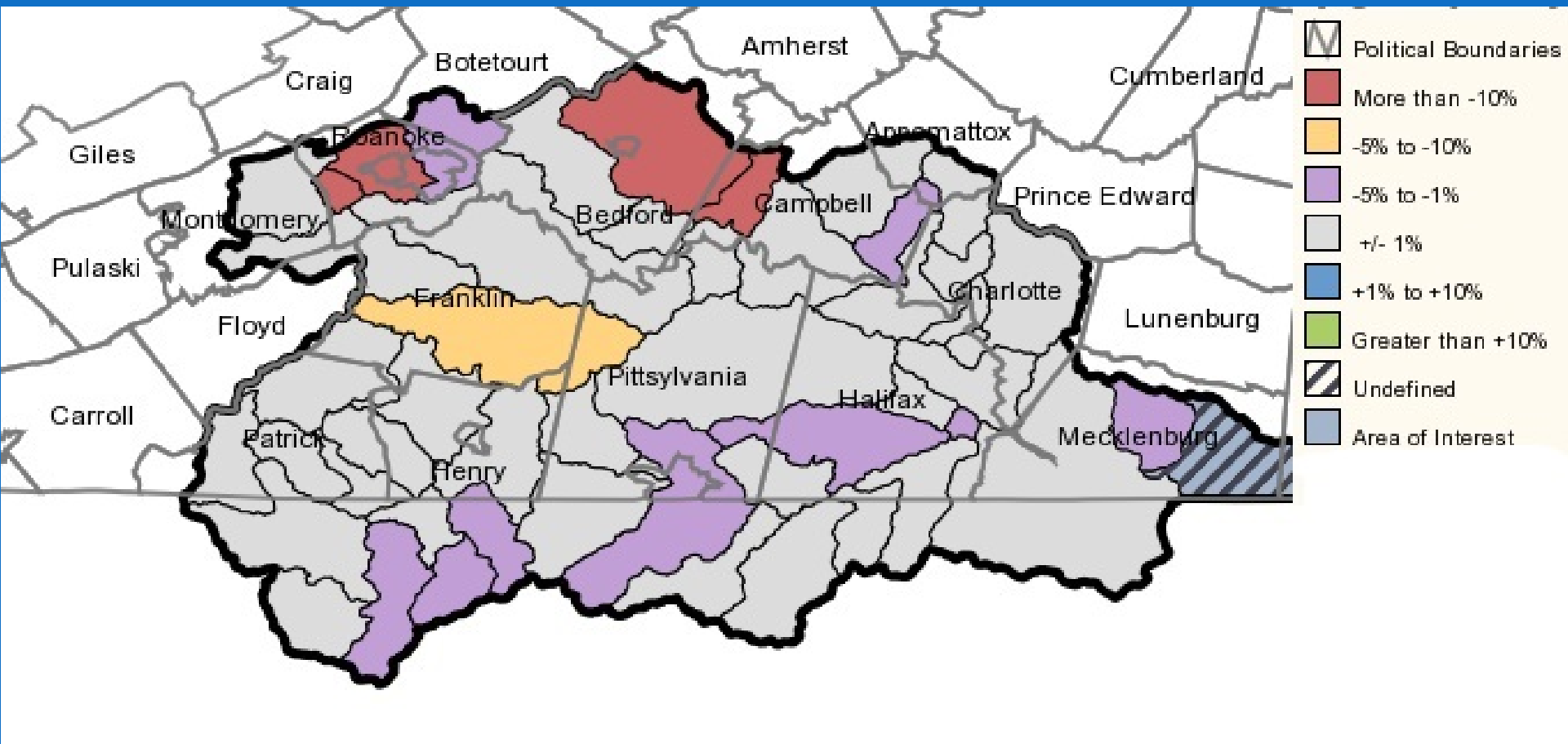
# Roanoke River Basin
# August Low Flow



# 7Q10

- Decreases in 7Q10 flows reduce the estimated waste assimilative capacity as well as flows for off-stream uses

# Roanoke River Basin: 7Q10

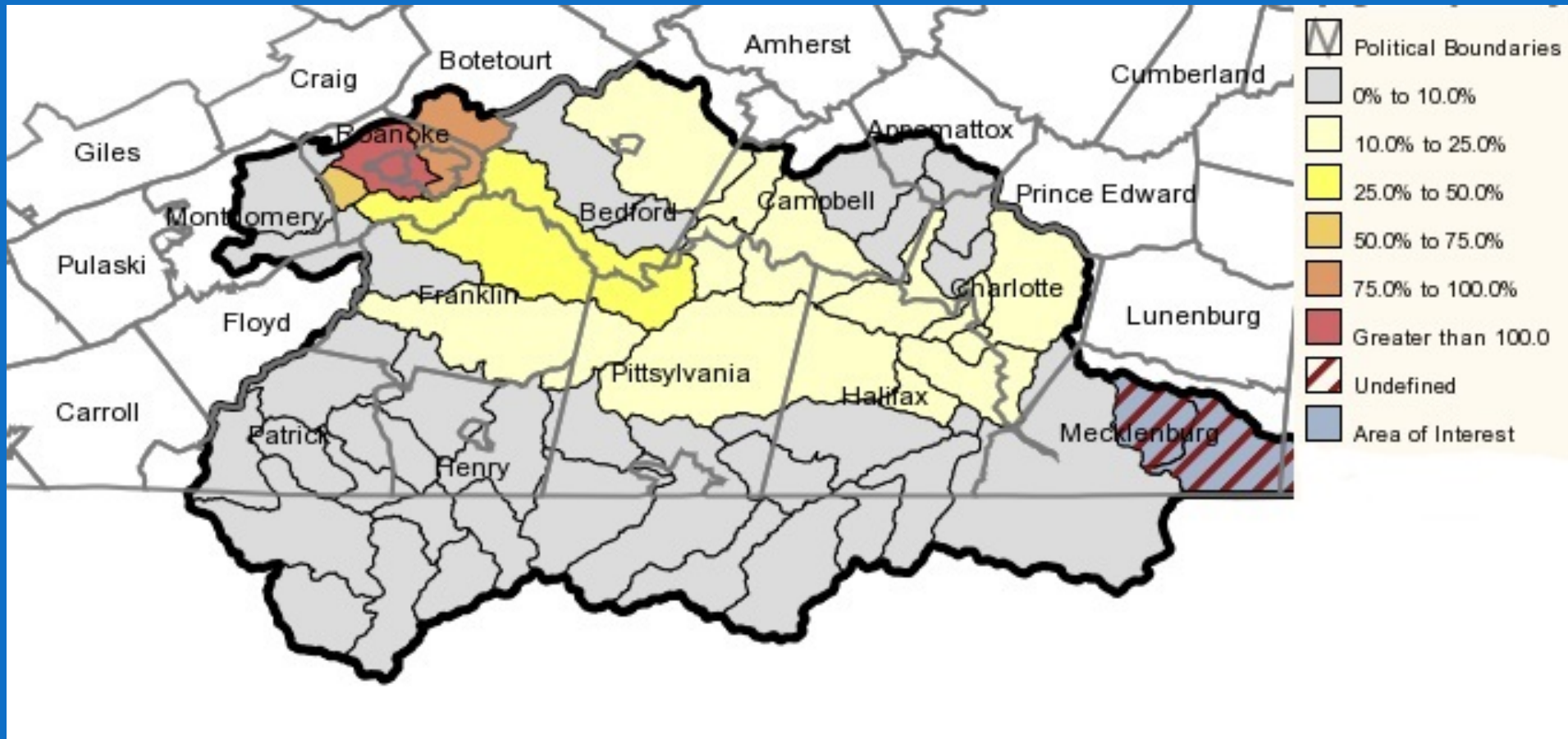


# Current Withdrawal as Percentage of September Drought Warning Flow

- Indicator of cumulative water supply system stress, resulting in either downstream flow reductions, reservoir storage depletions, or increased conservation restrictions on off-stream demands

- Greater than 25% considered to be high risk

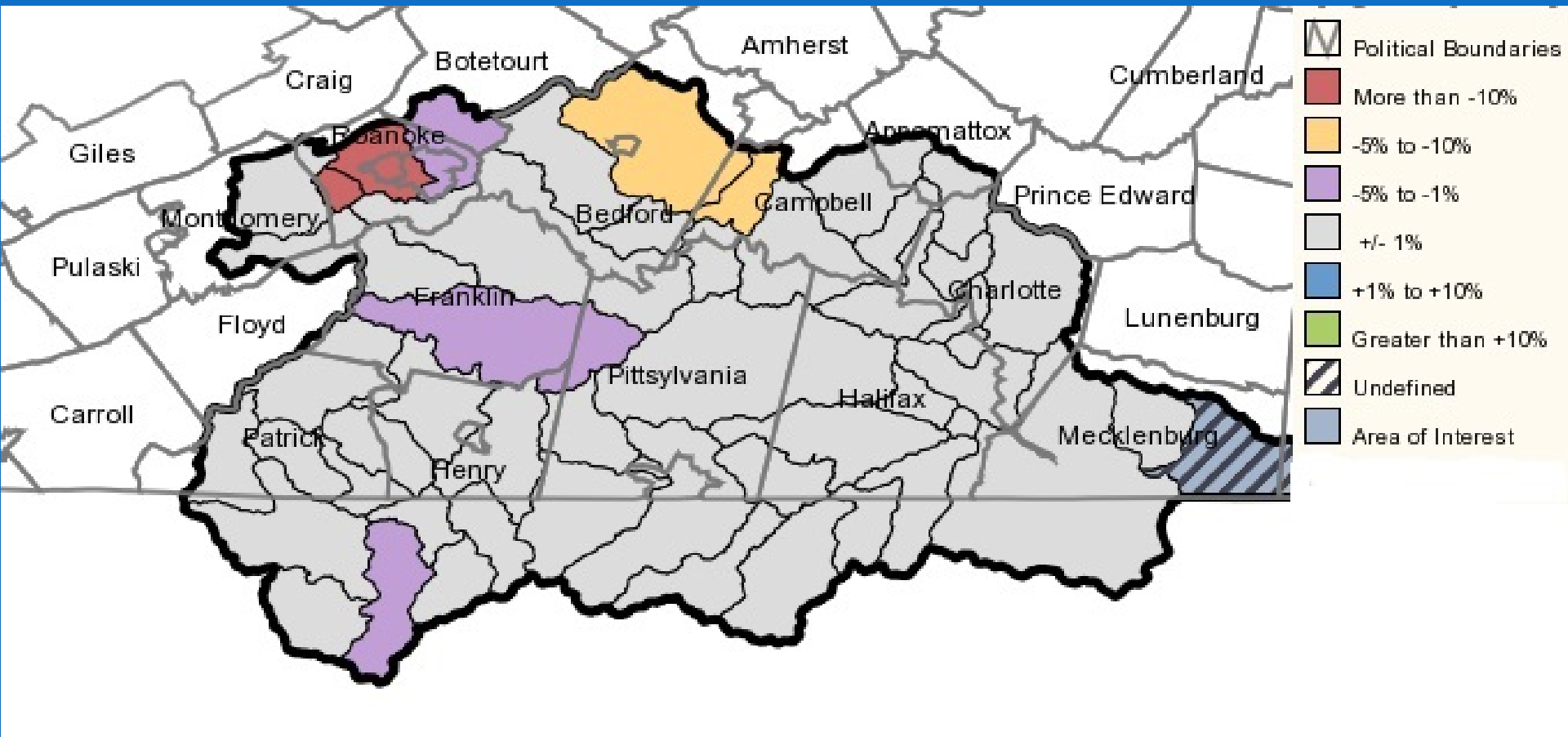
# Current WD as % of September Drought Warning Flow



# Drought of Record

- These flows are the ultimate limiting factor in safe yield
- Greater than 5% reduction considered to be high risk

# Roanoke River Basin Drought of Record



# Roanoke River Basin: Deficits and Alternatives by Water Supply Planning Region

# Charlotte County Regional WSP

- Deficits anticipated in towns of Drakes Branch, Phenix, Charlotte Court House, and Keysville
- Alternatives considered include Clarification of safe yield for Keysville Reservoir, additional groundwater supplies, development of a water treatment plant at Drakes Branch Lake, and system interconnections

# Halifax County Regional WSP

- Halifax County Service Authority anticipates reaching 80% VDH permitted capacity around 2035
- To address deficit, increase in the permitted withdrawal on the Dan River

# Region 2000 WSP

- Deficits expected for Bedford Regional Water Authority, Campbell County Utility and Service Authority, Towns of Altavista and Appomattox

# Alternatives Considered to Meet Demand for Region 2000

- Lakes Regional Water Treatment Plant on Smith Mountain Lake
- Increased purchase from Lynchburg (BRWA)
- Boxley Rock Quarry
- Intake on Roanoke River, water agreements with Lynchburg City or Bedford County (CCUSA)
- Additional groundwater sources, reservoirs, intakes, inter-connections, reuse and recycling, and demand management

# Roanoke Valley-Alleghany Regional Commission

- Deficits expected for Botetourt, Franklin, City of Salem, and Towns of Boones Mill and Troutville

# Alternatives Considered to Meet Demand for RVARC

- Expansion of the Smith Mountain Lake Regional Water Treatment Plan in Bedford County
- New intake on Smith Mountain Lake to supplement Western Virginia Water Authority's (WVWA) Carvins Cove reservoir system
- Development of new groundwater sources is also mentioned by some of the localities with predicted water supply deficits

# West Piedmont Regional WSP

- Deficits expected for Henry County and the Town of Gretna
- Alternatives considered to meet demand include increased withdrawal from the Upper Smith River (HC) and raw water intake on Whitethorn Creek and a pipeline to Georges Creek Reservoir (Gretna)

# WSP: Existing Sources Expected to Meet Demand

- Lake Country Regional WSP
- New River Valley WSP
- Southwest Virginia Regional WSP

# Summary for the Roanoke River Basin

- Population expected to increase 14.3%
- Projected water demand is estimated to increase 23.5% from 2010 to 2040
- Majority of population growth likely to occur outside community water system service areas

# Questions?